Out of Print:
Reimagining the K-12 Textbook in a Digital Age

SETDA

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About the State Educational Technology Directors Association

Founded in the fall of 2001, the State Educational Technology Directors Association (SETDA) is the principal association serving, supporting, and representing US state and territorial educational technology leadership. SETDA works in partnership with like-minded individuals and organizations as a forum for inter-state collaboration, cooperation, and best practices. Our work is funded by state membership dues, private sector contributions, charitable foundations, and the federal government.
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Report Authors

Geoffrey Fletcher
Dian Schaffhauser
Douglas Levin

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John Bailey, Executive Director of Digital Learning Now, Foundation for Excellence in Education

David Byer, Senior Manager, Education Leadership and Policy, Apple, Inc.

Jennifer Childress, Senior Advisor, Science, Achieve

Ed Dieterle, Senior Program Officer for Research, Bill & Melinda Gates Foundation

Karen Fasimpaur, President, K12 Handhelds & Organizer, Peer 2 Peer School of Education

Diana Gowen, Alliance Manager, Strategic Education Programs, Intel

Kelly Griffin, Director, Distribution and Accessibility, Instructional Materials and Educational Technology Staff, Texas Education Agency

Greg Grossmeier, Education Technology and Policy Coordinator, Creative Commons

Andrés Henríquez, Program Officer, National Program, Carnegie Corporation of New York

Chuck Hitchcock, Chief Officer, Policy and Technology & Director, National Center on Accessible Instructional Materials at CAST

Karen Kahan, Director, Educational Technology, Texas Education Agency

John Keller, Assistant Superintendent for Technology, Indiana Department of Education

Glenn Kleiman, Executive Director, Friday Institute for Educational Innovation, North Carolina State University College of Education

Julie Mathiesen, Director, Technology and Innovation in Education, South Dakota

Jeff Mao, Learning Technology Policy Director, Maine Department of Education

Tammy McGraw, Director, Office of Educational Technology, Virginia Department of Education

Whitney Meagher, Project Director, National Association of State Boards of Education

Margo Murphy, Office of College & Career Readiness, Louisiana Department of Education

Steve Nordmark, Chief Academic Officer, Knovation

Jose Ortega, Administrator, Education Technology Office, California Department of Education

Jesse Paprocki, Regional Vice President, North American Business Development, School Systems, Pearson

Nancy Perkins, Vice Chair, Maine State Board of Education

Linda Pittenger, Network Director, Next Generation Learners, Council of Chief State School Officers

Rusty Rosenkoetter, Coordinator, Missouri Department of Elementary and Secondary Education

Elizabeth Ross, Common Core State Standards, National Association of State Boards of Education

Stephen Sanders, Director, Instructional Media and Technology, Wisconsin Department of Public Instruction

David Teeter, Director of Policy, International Association for K-12 Online Learning

Bill Tucker, Deputy Director, Policy Development, U.S. Program Policy & Advocacy, Bill & Melinda Gates Foundation

Victor Vuchic, Program Officer in Education Technology and Innovation, The William and Flora Hewlett Foundation

David Wiley, Senior Fellow, Digital Promise & Associate Professor of Instructional Psychology and Technology, Brigham Young University

Tom Woodward, Assistant Director, Instructional Technology, Henrico County Public Schools, Virginia

Peter Zamora, Director of Federal Relations, Council of Chief State School Officers

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Executive Summary

Technological innovation is driving fundamental changes in all aspects of our lives. This is especially true of digital content, as our use of e-books, downloadable music, streaming television and movies, and online social networks has exploded. However, the explosive growth in our use of digital content seems so far to have eluded many of the 50 million students enrolled in public K-12 education. In spite of the fact that states and districts spend $5.5 billion a year in core instructional content, many students are still using textbooks made up of content that is 7 to 10 years old. In 2012, it is still the exception—not the norm—that schools choose to use digital content, which could be updated much more frequently, or opt to use the multitude of high-quality online resources available as a primary source for teaching and learning.

The reasons are many, but the result is this: Too few schools are exploiting digital instructional content for all of its benefits. While many in education continue to perpetuate the decades-old textbook-centric approach to providing students and teachers with instructional materials, the gap is widening between what technology allows us to do in our lives—how we communicate, work, learn, and play—and how we're educating our kids.

Nonetheless, it is not a question *if* the reimagining of the textbook will permeate all of education, but only a matter of how and how fast.

Armed with a cost-effective computing device and the kind of quality digital content that's becoming increasingly available, the benefits for student learning are many. Digital content can easily be kept up to date and relevant to students' lives without the cost of reprinting or redistributing print materials such as a textbook. It can be made available anytime and anywhere, both online and offline, and accessible when and where the student, teacher, or parent needs it. It can be personalized to individual student learning needs and abilities. And, digital content can be far richer and engaging, including not only text, but also high-definition graphics, video clips, animations, simulations, interactive lessons, virtual labs, and online assessments. Instead of fitting students to content, digital content allows the teacher to fit the content to the student.

The primary benefit of digital content may be its flexibility. Crucial to realizing the flexibility benefit are open educational resources (OER), resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others in perpetuity.

States are the key to driving instructional materials innovation. With primary responsibility for determining the process and funding models for instructional materials acquisition in their schools, states have started to implement significant policy changes—in some cases with the support of the federal government—that are giving powerful momentum to the shift from print to digital content.

For instance, Indiana is redefining textbooks and providing flexibility in the use of "textbook funds;" Texas has enacted a similar definition shift and added an education portal to share content; Utah has begun a significant shift to OER; and Virginia is leveraging other digital initiatives in assessment to support innovative digital content development.

In total, 22 states have introduced either definitional or funding flexibility, launched a digital textbook initiative, and/or launched an OER initiative. Common to virtually all of these efforts are strong state leadership, a culture of innovation, a belief in increased local flexibility in spending and content choice, and strong implementation plans.

Yet, policy changes regarding instructional materials are not sufficient to ensuring that digital content gets into the classroom and is used effectively. In making the shift to digital instructional materials, states and districts need to address the following interrelated issues:

- **Sustainable funding for devices**. Without easy access to devices, students cannot take full advantage of the digital content (and these same devices can and should be leveraged for other educational ends, including online assessment and access to online learning).
- **Robust internet connectivity**. States need to plan for and implement a network and internet infrastructure sufficient to enable pervasive, simultaneous use of devices for instruction, assessment, and school operations.
- **Up-to-date policies and practices**. In addition to state policy changes, local districts need to examine their policies and practices to jettison those that inhibit the use of digital content and look for initiatives and incentives to encourage its use.
- **Prepared educators**. Colleges of education need to prepare teachers to use digital content, and districts need to provide opportunities for sustained professional learning, including online access to communities of practice.
- **Intellectual property and reuse rights**. A key benefit of digital content is its flexibility, but content should be licensed as to take advantage of the flexibility and encourage sharing and customization.
- **Quality control and usability**. If digital content is vetted at the local level and tagged in such a way as to make it easy to find and use in a variety of situations, it saves teachers time and helps them to personalize learning in their classrooms.
- **State and local leadership buy-in**. Leadership is a key factor in changes in state policy and it is no less important at the local level. Leaders provide the necessary vision and support to enable successful implementation planning.

Given current trends and building upon the real-world experiences of states and leading districts, the State Educational Technology Directors Association (SETDA) offers the following recommendations for K-12 policymakers, school leaders, and publishers:

Recommendation 1: Complete the Shift from Print-Centric Textbook Adoption Practices to Digital Resources within Five Years

SETDA recommends that states and districts commit to beginning the shift from print to digital instructional materials with the next major "textbook" adoption cycle, completing the transition by no later than the 2017-18 school year. If the commitment is not made immediately, major funding will go toward providing students and teachers with static, inflexible content that will be in place for 5 to 10 years, depending upon the length of the cycle.

Recommendation 2: Develop a Vision and Roadmap for Completing the Shift

SETDA recommends that state and district leaders establish a clear vision for the use of digital and open content and clearly communicate that vision to school leaders, teachers, publishers, technology companies serving the education community, and the public at large. The vision should look beyond textbooks alone and consider flexibility, quality, and effectiveness of all materials. Any such vision and roadmap should pledge at a minimum to:

Recommendation 2a: Eliminate Unnecessary Regulations and Enact Supportive Policies. States, districts, and publishers must re-examine and revamp all processes for the creation, acquisition, and use of instructional materials to take advantage of what digital content can bring to the education sector.

Recommendation 2b: Invest in Infrastructure and Devices to Support the Shift. States and districts should pursue cost-effective collaborative purchasing of student computing devices and increase flexibility of funding in dedicated funding streams to optimize the use of digital resources in schools and to leverage the larger print to digital shift in education across assessment, instruction, and professional learning.

Recommendation 2c: Ensure Effective Implementation of Digital Policies. To be successful, states and districts must identify and disseminate effective models of implementation on how to make the shift from print to digital, including for teacher preparation and support.

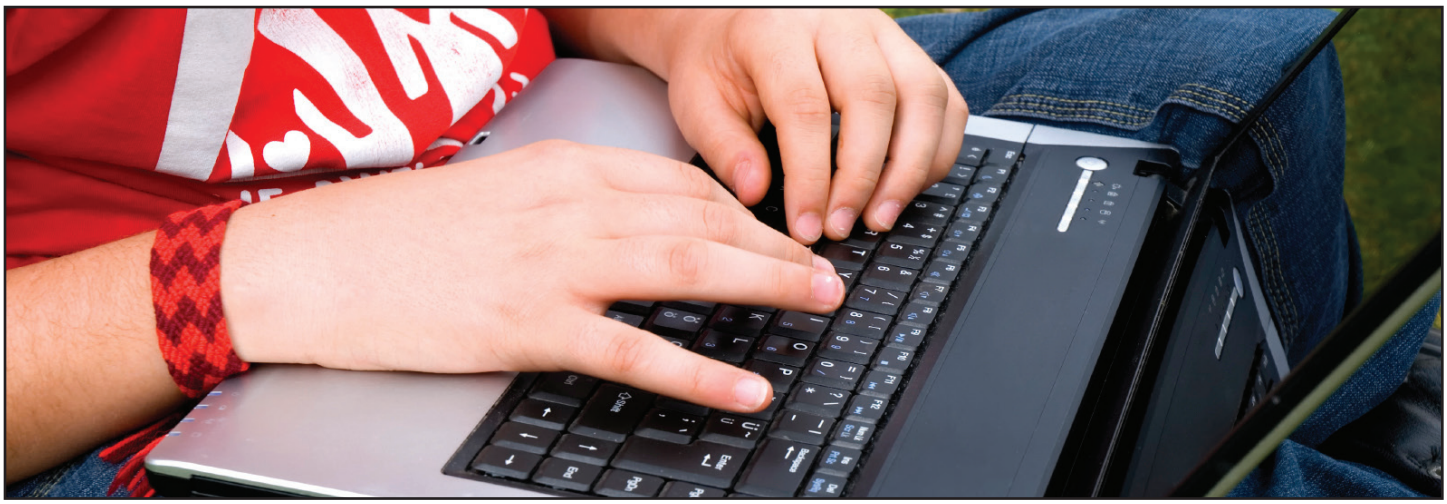
Recommendation 3: Ensure a Vibrant Marketplace for Digital and Open Content

SETDA recommends that policymakers, educators, and business leaders collaborate to create alternative, flexible models for the creation, acquisition, distribution, and use of digital content.

Implementing these recommendations and reimagining an integral element of the educational system within five years is a daunting task. Yet, as this report highlights, leading states and districts have traveled partially down the path already—and our students are ready. If we are serious about offering a college- and career-ready education for all students, we do not have the luxury of further delay.

It is past due time to reimagine the future of the K-12 textbook. Join us.

Reimagining the K-12 Textbook: The Opportunity



Dylan unplugs his tablet and puts it into his knapsack. He declines his mom's offer for a lift to school this morning. With no reason to haul close to 20 pounds of books, he'd rather walk with a buddy. When they get to school, Dylan's friend checks out a netbook from the library, knowing that it will provide him with the materials online that he'll need in his classes. The school's shared server gives him access to his files.

Dylan's homeroom teacher tells the class to continue work on a social studies project, creating a timeline to show events that have happened in the world since they were born. Dylan opens up a digital lesson chosen from a state educational content repository by his teacher that covers the latest decade. The resource was licensed under a Creative Commons license, and a small group of educators in another district has updated the material to cover the most recent world events. Dylan has chosen to include the final shuttle flight in his timeline. He clicks on a URL included in the lesson and is quickly linked to a school-approved website that shows a video made by NASA.

While the students are working on their projects, the teacher reviews the previous day's English and language arts assignments via the learning management system. Dylan is still having trouble understanding the concept of paraphrasing. To personalize the learning he's doing in class, she performs an online search and finds a dozen learning objects highly rated by other seventh grade teachers from around the country and tagged specifically for the relevant Common Core State Standard. She sends an email to Dylan, telling him to watch a 10-minute animation that teaches the basics of paraphrasing, pulled from a collection to which the district has a paid subscription, and asks him to practice paraphrasing an essay featured in digital content created by a national nonprofit organization and made available free to educators through its website.

Next door, a math teacher is prepping for an afternoon class on statistics. Since quiz scores are showing that most of the students need some extra help, he adapts his lesson to encompass some additional digital lessons provided by a major publisher for which the district has a district-wide license. After he covers the concepts, the teacher has the students work through online exercises provided by the same company. As they individually finish the exercises, their scores automatically show up in a student assessment system that's integrated with the publisher's materials so that the teacher knows precisely which students are going to require extra coaching.

Later that night, just before he heads to bed, Dylan pulls up the timeline he's built on his tablet and enthusiastically shares it with his parents. His mom smiles, recalling how he'd never willingly show off his school work before. Was school this interesting when she was a student?

Technological innovation is driving fundamental changes in all aspects of our lives, both occupational and recreational. Technology and its related tools are an integral part of work for accountants, mechanics, sales directors, and doctors. Outside of work we schedule travel, sell and buy goods and services, and talk face to face with loved ones halfway around the globe, all with the assistance of technology. This is especially true of digital content, as it has permeated our lives through e-books, music, television, movies, and social interactions. However, its explosive growth seems to have sidestepped many of the 50 million students enrolled in public K-12 education. In spite of the fact that the United States invests $5.5 billion a year in textbooks[1], many students are using printed books that are 7 to 10 years old and contain outdated material.[2] It's the exception—not the norm—when schools choose to use digital content that could be updated much more frequently or opt to use the multitude of high-quality educational resources available from all kinds of publishers (commercial, nonprofits, university-based, individual educators, or even students themselves) as a primary source for teaching and learning.

The educational environment isn't exploiting digital content for all of the benefits that can accrue for today's learners. The gap is widening for what we do in our lives — how we communicate, work, learn, and play — and how we're educating our kids.

There are multiple reasons for the lag in moving to digital content:

- State laws and policies have not kept pace either with changes in technology or uses of technology in schools.
- Vetting of content often occurs in such a way as to discourage many publishers from competing in the market and eliminating many materials that could be used effectively by educators and students.
- There is inadequate access to technology and technical support in schools and homes for a fully equitable shift to digital content at district or state levels.
- The business model for the creation, acquisition, distribution, and use of instructional materials in K-12 education is more than a half-century old and has become a barrier to innovation.
- Modern teacher training models are insufficient in many teacher preparation programs.
- Given the variability of material available on the internet, there is a perception of inferior quality as compared to print content.

The reasons are many, but the result is this: The educational environment isn't exploiting digital content for all of the benefits that can accrue for today's learners. The gap is widening for what we do in our lives—how we communicate, work, learn, and play—and how we're educating our kids.

The Opportunity

Education is changing in so many ways, with a major focus on improving student learning outcomes. The progress made on developing and adopting more rigorous Common Core State Standards (CCSS) and other revised state curriculum standards is guiding teachers to remap what and how they teach. Having CCSS provides unprecedented opportunity to ensure content is aligned to the standards without having to take into account often seemingly idiosyncratic differences from state to state. Teachers and administrators alike are getting a more mature grasp on how to use data to measure and improve learning. District technology support is becoming more knowledgeable about how to deliver the teaching, learning, and assessment services needed by their schools.

Likewise, the primary tool we currently equip our students with—the textbook—is being rethought. Armed with a cost-effective computing device and the kind of quality digital content that's becoming increasingly available from for-profit and not-for-profit providers and through free open education resources, all students can have access to instructional materials that are more personalized and thus more effective and engaging. Students with these materials are more likely to learn, increase achievement, stay in school, and graduate. It is not a matter of *if* reimagining the textbook will permeate all of education, only a matter of how fast.

The State Educational Technology Directors Association (SETDA), the principal association serving, supporting, and representing US state and territorial educational technology leadership, has a record of addressing the positive potential of implementing digital content both as an organization and as exemplified by many of our members' efforts within their states. This SETDA report supports the case for promoting the use of digital content in the K-12 education environment.

In a time of tight budgets, many states and school districts today are in an increasingly expensive and untenable position with respect to ensuring access

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by students and teachers to instructional materials: purchasing both print and digital materials, many of them duplicative, in an uncoordinated fashion and with too little focus on quality.

We know that more states, districts, and schools need to begin taking advantage of all of the many benefits provided through digital content. If we do not, our schools risk becoming as out of sync with how students engage in learning as a decades-old science book that makes no reference to climate change.

Terminology

In this paper we are focusing on **digital content** that is used in K-12 schools. This term can have broad application and include everything from snippets of video to full-year textbooks in a digital format along with all the video, audio, text, animation, simulations, and assessments in between. Thus, digital content can consist of smaller "chunks," such as individual chapters or lessons, allowing for flexibility in creation, purchasing, distribution, and usage. It is blurring the traditional division between "adopted" or "core" content and supplemental content.

While **online courses** created for the primary purpose of virtual schools are delivered digitally, they are not directly addressed in this report.

The terms **e-textbooks** or e-books are often used in the media; and while they may convey the notion of digital content as core information for teaching and learning, they also perpetuate the old notion of a single textbook per subject as being the optimal source of instructional material.

Also, many in the public and the media become focused on the actual delivery mechanism for the digital content, which can range from e-readers such as the Kindle or Nook, tablets, laptops, learning management systems, to some combination of devices. The type of delivery mechanism can vary from school to school; however, no matter what is selected, it should meet the needs of the students and educators and allow them to easily access and use content to effectively facilitate the learning of all students.

Definitions of **Open Educational Resources** (OER) may vary slightly, but in general OER are teaching and learning materials licensed in such a way that they are free and may be used, reused, remixed, and otherwise customized to meet specific needs.

The Digital Difference

The benefits of digital content for student learning are many. Digital content can easily be kept up to date and relevant to students' lives without the cost of reprinting or redistributing print materials such as a textbook (although digital content can be printed out when the need is there). It can be made available anytime and anywhere, both online and offline, accessible when the student, teacher, or parent needs it, whether from home, school, or another location. And digital content can be far richer and engaging, including not only text, but also high-definition graphics, video clips, animations, simulations, interactive lessons, virtual labs, and online assessments.

The primary benefit of digital content is its flexibility. A traditional print textbook is hundreds of pages long with sufficient content to cover an entire year and can cost up to—and in some cases even more than—$100 per book per subject/grade. As such, traditional textbooks are typically slated to be used for 6 to 10 years, partially to amortize the cost. This in turn encourages schools to be very protective of the books, forbidding students to write in them or in some cases even take them out of school. In contrast, digital content can be acquired in smaller pieces (i.e., chapters or lessons vs. the whole scope and sequence) and those pieces can be assembled and used in many places in a K-12 curriculum, not just in one subject area in one grade. This flexibility in approach extends far beyond the classroom, beginning with the actual creation of the content to its sale and distribution, allowing for more content creators and multiple business models. Students and educators alike can create accurate, high-quality, engaging content that can be shared via the internet with others around the globe.

The key to realizing the flexibility benefit is open educational resources.

The key to realizing the flexibility benefit is open educational resources (OER). According to a report written for the William and Flora Hewlett Foundation:

"OER are teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others. [OER] include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge."

A Parallel Push by Higher Education

Universities and colleges are pursuing multiple paths in their efforts to introduce the use of digital content to replace printed textbooks. Current estimates pegged digital textbook sales in higher education at 3 percent in 2011[4], with sales projected to reach 35 percent by 2016.[5]

However, unlike K-12, which has many compelling reasons for shifting to digital content, the main goal in higher education currently is to reduce the high cost of instructional material to students and their parents. Student Public Interest Research Groups (PIRGs), state student organizations that work on public interest issues, estimate that the average college student spends $1,168 a year on textbooks and course materials.[6] That's a cost, says one observer, "that could shrink with mainstream digital textbooks."[7] The organization is promoting the use of open textbooks by providing links to them on its website and organizing national, state, and local advocacy campaigns.

Several states, Washington and California among them, are introducing initiatives intended to make materials from the most enrolled in postsecondary courses available as OER offerings or inexpensive digital texts.[5]

Movement is also happening on the commercial textbook side. In 2011, Indiana University negotiated agreements with multiple major publishers to dramatically reduce the price of textbooks by making them available in a digital format, extending the period for which students have access to them, and giving more flexibility in how the material may be used. In return, the university guaranteed that the publishers would receive a fee from every student in a given course using the digital texts. The students access the material through Courseload, a digital content platform that runs on any device that can use a Web browser.[8] The course fee model has now been picked up with some variation by other institutions, such as the University of Minnesota and the University of California Berkeley.[9]

While print materials can be OER, where the true value of OER comes into play is the ability for educators to reuse, remix, and generally customize any OER to specific students' needs. And, as the Hewlett Foundation definition states, OER are free; this is backed up by the Creative Commons, an organization that encourages the sharing of creative works such as OER through free legal tools.

The North Carolina eLearning Commission identified eleven potential advantages of the transformation to "digital education resources":[3]

- **Up-to-date information** updating and publishing additional information for greater accuracy and timeliness
- **Multimedia and interactivity** that allows for more and better student engagement
- **Customization** to address individual student needs
- **Adaptability** for special learning needs
- **Student annotations** incorporating digital tools without damaging the materials
- **Availability** guaranteeing access anytime, anywhere
- **Potential cost savings** over time
- **Increasing competition** through altering business models and encouraging a variety of providers
- **OER** to encourage reuse, remixing, and redistribution of quality content that can be customized for individual students
- **Addressing health issues** by lightening the backpack
- **Emerging resources** are being generated from foundations, states, new collaborative partnerships, and teachers themselves

SETDA sees four primary interrelated advantages to increasing the use of digital content in today's schools. Over time and with good implementation, a shift to digital content will:

- Increase student learning and engagement
- Accommodate the special learning needs of students
- Facilitate the search and discovery of unbundled resources
- Support educators in personalizing learning

Student Learning and Engagement

A study in 2007 done by Eduventures queried teachers and administrators on a number of issues related to the perceived benefits of digital content in the classroom. Nine out of 10 respondents in both groups stated that they believe digital content offered more current information, increased the level of student engagement, and improved the quality of instructional materials. A majority said digital content enhanced the effectiveness of the classroom educator.

These educators recognize that digital content is well suited to address what Project Tomorrow in one of its broad open surveys of students, parents, educators, and administrators calls the "new 3 E's of Education: enable, engage, and empower."[10]

Students are **enabled** "to reach their potential through increased access to educational resources and experts that extend learning beyond the capacities or limitations of their school or community."[10]

Barrow County School District, Georgia

Barrow County School District in Georgia is working with Georgia Tech scientists in a set of pilot programs that outfit teachers, students, and higher education faculty with digital tablets and high-definition video-conferencing to extend middle and high school science classes outside of the classroom to show students how researchers work in their laboratories. Before the introduction of the program, Direct to Discovery (D2D), for many years no student from that county had attended Georgia Tech. The launch of D2D has ignited interest in science: five Barrow students (four of them women) have chosen to attend Georgia Tech.[11]

Students are **engaged** in "rich, compelling learning experiences that develop deeper knowledge and skill development, especially the problem-solving, creativity and critical thinking skills so highly desired for our world today."[10]

iAchieve program, Creighton Elementary School District, Arizona

The iAchieve program at Creighton School District in Arizona allowed a group of third graders to use iPod touches to create their own expository books with organizational features such as a table of contents. The StoryKit app on the mobile devices let students record themselves reading their books and sharing them with classmates. iAchieve third graders improved by 8 percent from 2010 to 2011 on the Arizona's Instrument to Measure Standards (AIMS) reading assessment while students in nonparticipating classrooms improved by just half a percent.[12]

Finally, students are **empowered** to "take responsibility for their own educational destinies and to explore knowledge with an unfettered curiosity, thus creating a new generation of life-long learners."[10] That encompasses the notion of students creating and even distributing their own content, through blogs, e-portfolios, and other digital means.

Yarmouth High School, Maine
A senior at Yarmouth High School in Maine armed with a district-provided laptop (like 60,000 other students in the state outfitted with computers through the Maine Learning Technology Initiative) used its functionality to set up a program to bring together teens from her school with teens from Iraq to share information about themselves and "create a new image [of each other] by having personal interactions." Now the project is expanding to other high schools in her state as well as students in Saudi Arabia, Pakistan, and Israel.[13]

Digital content makes it easier to track student performance through formative assessment and progress monitoring. Teachers can provide alternative content with the click of a link when they notice that students are not being successful with the current content, allowing students to receive additional instruction on concepts they haven't completely mastered. While nobody should claim that the use of technology or digital content will guarantee excellent instruction, it can open the door for teachers to personalize learning by allowing the educator greater flexibility in how instruction is delivered.

San Diego Unified
After two years of testing, California's San Diego Unified School District has begun rolling out a large-scale netbook and tablet program and the wide adoption of digital content to 78,000 teachers and students in more than 1,300 classrooms. Says Barbara Allen, director of educational technology for the district, teachers "across the board have reported an increase in student engagement, more attention to the tasks at hand, and a more enthusiastic response to lessons, because students enjoy learning in this new medium."[14]

Accommodations for Special Learning Needs

The ability to adapt content and personalize learning is especially important for students with special learning needs. The current process involves retrofitting accessibility into existing instructional materials, a time-consuming and expensive process—and one that is glaringly insufficient to meeting the learning needs of today's students. As the pace of digital content creation speeds up and the number of creators expands, current approaches to serving students with special needs will no longer work. Teachers, families, and students themselves will increasingly demand more and better access to high-quality instructional materials.

The US Department of Education recently funded a five-year program with Benetech to continue the Silicon Valley nonprofit's work in creating free open source tools for content providers and working with those providers to make educational materials accessible from the start. The tools will tackle major challenges, such as accessible math and graphics. The organization expects to double its student membership to 400,000, grow usage of its tools

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by 150 percent, and increase to more than 200,000 the number of education titles in its library. It will also use the funding to expand its teacher training and parent outreach. Benetech will team up with the American Institutes for Research and other entities to accomplish the work.[15]

The National Center for Accessible Instructional Materials (AIM) at CAST is working with states to support the development of infrastructure needed to ensure that students with disabilities receive high–quality, accessible instructional materials in a timely manner. The AIM Center also promotes freely available tools that exemplify Universal Design for Learning (UDL), a framework for creating flexible learning environments to accommodate different learning styles. For example, the UDL Book Builder[16] provides authoring tools for developing online digital content that includes student response fields; "coaches" for building understanding; goal statements for the material in music and audio; hyperlinks, and a robust glossary for key definitions. The content provided includes a reading bar that provides text-to-speech with synchronized highlighting. These digital textbooks may be authored by students, parents, and teachers and then shared with others in online libraries.

The bottom line is that digital content can be more accessible and effective than print-based approaches to addressing the full spectrum of learning abilities in the nation's classrooms. If digital content developers and publishers design for accessibility and variability in learning abilities right from the start, not only will students with special needs benefit, all students will.

Other UDL related tools and resources, such as the free "CAST Science Writer" and "CAST Strategy Tutor,"[17] may be used directly by educators or used to provide guidance to those who are responsible for developing specifications for new online learning environments. CAST provides additional tools and supports for developing UDL curricula on the UDL Center website. When learning goals, teaching methods, materials, and assessments are universally designed from the start, educators can prevent many of the learning challenges created by an inflexible and nonsupportive curriculum.

Digital content tools also are proving useful to students with learning disabilities or those who struggle with reading. Some tablets' use of digital versions of books in English classes, for example, can provide an audio version and study guides, enabling a student to listen to the book and follow along on the tablet.

The next generation of iOS, Apple's mobile device operating system, will offer two new accessibility features to an already robust set. "Guided Access" will allow for the lockdown of an iOS 6 device to limit its use to a single app, especially useful to students with disabilities such as autism, since it will help them stay focused on the current task.

The bottom line is that digital content can be more accessible and effective than print-based approaches to addressing the full spectrum of learning abilities in the nation's classrooms. If digital content developers and publishers design for accessibility and variability in learning abilities right from the start, not only will students with special needs benefit, but all students will. Moreover, once an educator has tailored content to suit a student's personal learning needs, that accommodation can be shared and leveraged by everyone (providing that content is openly licensed).

Unbundled Search and Discovery

The ability of educators to locate just the right resource, lesson, or chapter as they need it is an important consideration with digital content. There may be hundreds of potential resources to use for any given lesson when the teacher has the entire World Wide Web to choose from. To find and select among the vast array of content can be daunting. Therefore a number of tagging schema are being developed to simplify how educators search for the specific materials they need. A "tag" is a descriptive term applied to a lesson or "chunk" of content that identifies it by such characteristics as intended grade level (fifth grade), class type (science), and specific topic (atoms and molecules) and standard.

The widespread adoption of CCSS and the possibility that its science counterpart, the Next Generation Science Standards, also will be adopted broadly highlights another strong advantage of digital content—greater ability to align and tag content to the CCSS. With the pending launch of CCSS in most states, educators across the country are already applying digital tags to content they use. The tag can accompany the content wherever and whenever it's used. Eventually, these tags will allow the search process to become ever more granular, helping teachers identify resources not just for specific grade levels and subjects, but for individual items within a given standard.

> ***When information is digitized it becomes more portable, more available on those wonderful devices. We were asked—as we were always asked—are people getting smarter or dumber. My standard answer: There hasn't been any discernible change. My giant piece of evidence: the level of political knowledge in 2008 vs. 1988—no change; the same proportion in 2008 knew who the Speaker of the House was; the same number of people knew who was Chief Justice. My colleague said, 'Yeah, but what if they had an iPhone in their hands? In five seconds they'd know who the Speaker of the House is.' That's a big story about the digitization of information.***
>
> —Lee Rainie, director of the Pew Research Center's Internet and American Life Project[18]

Some states and districts are making a concerted effort to undertake such a task. For example, Maine brought together exemplary teachers from around the state and provided training regarding high-quality digital content. The teachers then began to look for digital materials that fit the standards within their content area and began to tag the materials they found. Michigan's portal, Michigan Online Resources for Educators, has lesson plans and other resources tagged to specific content standards. Other states and school districts are engaged in similar efforts.

One important tagging effort that surfaced during 2011 is the Learning Resource Metadata Initiative (LRMI), co-led by the Association of Educational Publishers and Creative Commons. If adopted by organizations that maintain online repositories of digital content, the LRMI will create a framework for use by the major search engines—Google, Bing, and Yahoo!— to help students and teachers more easily find digital learning resources that complement learning standards, including those in CCSS. The intent of LRMI is to dramatically increase the accuracy and usefulness of online search engines by establishing a common vocabulary for describing learning resources. Likewise, content providers that refer their users to online resources will be able to provide more relevant and personalized recommendations and services. For example, "Mathematics" as a subject is less useful

than “Arithmetic, Number and operations, Ratio and proportion.” LRMI will bring consistency to the descriptions.

A related technical effort—focused on expanding our collective intelligence about how students and teachers leverage the use of digital resources—is the Learning Registry. This open source framework was developed by a team of public and private collaborators to facilitate the exchange of digital data behind the scenes. Like the LRMI, the Learning Registry is not a destination that educators will go to. Rather, districts, states, and content creators that implement Learning Registry services will enable educators everywhere to more easily find information— user ratings, comments, downloads, standards alignment, and more—about content specific to their needs no matter where it resides online. The Learning Registry will support information sharing for material posted freely online, as well as for resources that are only accessible via purchase and/or subscription.

In other words, instead of fitting students to content, digital and open content allows the teacher to fit the content to the student.

Finally, the Shared Learning Collaborative is an alliance of organizations building a shared technology infrastructure to support the CCSS and help states and districts provide teachers with the instructional data and tools they need to deliver personalized learning. That infrastructure will include middleware to integrate the data locked in applications across states, a data repository for storing learning data, dashboards to make the data more useful for educators, and other components.

Support for Personalized Learning

Digital content lends itself far more easily than printed matter to personalized instruction. Because it’s more flexible in digital form, the curriculum can be customized from student to student. Teachers can mix and match their materials with other educators’ resources to the digital content being made available to students. Course content can be broken up into specific lessons to address learning gaps where needed. Through continual assessment, fine-tuning of instruction can occur. When a student doesn’t understand a specific lesson, the teacher can quickly direct him or her to an online lesson that provides explanation, interactive exercises, and assessment to ensure the new lesson is effective— all while the teacher is working with other students at their level of understanding. In some cases, the digital content itself can direct the student to additional materials to enhance or expand the learning.

In other words, instead of fitting students to content, digital content allows the teacher to fit the content to the student.

Self-directed learning, a much-sought goal of 21st century education, can really blossom with digital content. As students become more adept at using digital content and building their digital literacy, they’re able to choose their own sources for learning rather than simply being fed lessons through the filter of a textbook or a single teacher. In the optimal scenario, the student is inspired to expand learning beyond school, and that means shifting effortlessly from school-sanctioned lessons to other resources, a feat made easier with digital content.

Pew Research Center's Internet and American Life Project reports that knowledge is no longer "built on text and static pictures—it's disrupted, scattered." Students rely on links for their learning in order to check primary sources. "Self-paced learning can now be provided in the classroom," says Lee Rainie, director of the Pew project. "Children understand there is some burden and some reward. If they're desperate to learn how to create new knowledge, they'll find a way to get that."[18]

The digital scenario holds the promise of presenting schools and their teachers with access to a continually growing and changing pool of diverse multimedia content, which can be quickly sorted by subject and grade, and peer- and expert-ranked to help teachers find just the right learning objects for use in a given class for a particular lesson.

This is the case at Vail School District in Arizona, which has an initiative called "Beyond Textbooks" that's growing statewide as other districts adopt the program, and features a quickly expanding repository of digital content created and shared by the teachers who participate in the program. Content is vetted by Beyond Textbooks staff for potential copyright issues, formatting problems, congruency to standards, and level of rigor.[19] Vail has used the Beyond Textbooks approach to increase student achievement in math and reading from levels near or below state averages prior to the start of the program to pass rates that are now consistently 20 percent or more above state averages and greater than 90 percent year after year at most grade levels.

Although many innovative teachers already use digital content, frequently what happens is that they're still forced to accept the textbooks approved by their district or state, and those books end up gathering dust on classroom bookshelves or are used sparingly. As Tom Woodward, assistant director of Instructional Technology at Henrico County Public Schools in Virginia, notes, "Much of the power [of digital content] comes from using things people actually like, things they'd use of their own free will."[20]

Profiles in State Instructional Materials Leadership

While progress is being made, American schools still have far to go in shifting from print textbooks to digital content. One current estimate puts digital textbooks at about three percent of the education textbook market in 2011.[21] Use of digital content is expected to grow at a year-over-year rate of more than 100 percent, but even then, according to Next is Now, the blog for a textbook distribution company, schools will have just 19.5 percent adoption by 2014 and 50 percent by 2018. The company also estimates that by 2014, when the Common Core State Standards (CCSS) are formally in place, openly licensed content will make up just 10 percent of digital content in education.

Pilot projects are taking place in hundreds of districts across the country to figure out the best combination of factors for helping digital content programs to grow more quickly. Possibly more important, significant policy changes are being created and implemented at the state level—in some cases with the support of the federal government—that are giving powerful momentum to the shift from print to digital content. In this section we profile initiatives undertaken in four states, Indiana, Texas, Utah, and Virginia, and provide thumbnail sketches of policy changes in other states.

Significant policy changes are being created and implemented at the state level – in some cases with the support of the federal government – that are giving powerful momentum to the shift from print to digital content.

Indiana: Accelerating Local Innovation

Traditionally, the State Board of Education in Indiana approved a list of textbooks, and districts—called "school corporations"—had to apply for a waiver to go off-list. In 2009, unhappy with submissions for social studies textbooks, the State Board of Education gave school corporations a blanket waiver to select their own materials. In addition to the freedom to select any textbook, the State Board further stipulated that schools could consider digital content and devices for delivering that content as appropriate expenses in the category of textbooks. Two years later the Indiana General Assembly passed into law an act (HB 1479) that placed into statute an expanded definition of "textbook" and removed the authority of the State Board of Education to adopt textbooks. HB 1479 places responsibility for review of print and digital curriculum on the Indiana Department of Education, which publishes the resulting reviews but doesn't eliminate materials from consideration. It's up to each school corporation to make its own decisions regarding textbook adoption.[22]

Uniquely, parents in Indiana pay a rental fee for the textbooks their children use, based on the cost of the books. With the 2009 changes, school corporations were able to divert that rental money as they chose, including using it to purchase computing devices and acquire digital content, a diversion that about 11 percent of schools took advantage of during the 2010-2011 school year.

> ***"We're not trying to use the limited funds that we have to help folks catch up. We have made it a priority to invest in corporations that are clearly demonstrating a local commitment and urgency to improvement. This is about helping people who are running fast run faster rather than helping folks catch up."***
>
> ***—John Keller, assistant superintendent for technology, Indiana Department of Education***

At the same time, the State Board of Education began issuing innovation grants to fund existing programs in districts that were making the shift from print materials to digital content in order to help accelerate and scale them. School corporations use the funds for a variety of projects, many involving deployment of devices and the use of digital content to a targeted grade at a specific school or for focused professional development programs.

The state has also taken the lead in structuring events and activities to encourage innovators in the use of digital content to "find" each other. These include sites visits, webinars, meet-ups, quarterly calls, conference presentations, and set-up of professional learning networks. The state encourages frank discussion among school corporations to share what's working and what's not working in order to encourage the abandonment of unsuccessful programs.

As John Keller, assistant superintendent for technology in Indiana's Department of Education, explains, "We're not trying to use the limited funds that we have to help folks catch up. We have made it a priority to invest in corporations that are clearly demonstrating a local commitment and urgency to improvement. This is about helping people who are running fast run faster rather than helping folks catch up."[23]

Indiana has seen some successes worth noting. For example, in 2010 some schools using digital content noticed double-digit increases—one as high as 31 percent—in the ratio of students passing end-of-course assessments. In another pilot where there were four curriculum choices with digital content made available to participating schools, none proved more or less effective with its gains than the others, but all demonstrated measurable gains. For example, algebra assessments done after one of the pilots increased by 5.6 percent vs. a state average improvement of 2.8 percent.[23]

This experimentation typifies another aspect of Indiana's approach. The state recognizes its limited capacity for funding to support innovation and experimentation, so it focuses its "small-scale trials" on schools that want to go first. As Keller notes, "We're willing to help take the financial risk out of trying new promising products so that schools that are interested in such innovations can then reallocate their own resources to purchase the service once they've had a chance to observe it in action in the Indiana context."

Texas: Introducing Funding Flexibility

Texas, the first state to redefine "textbook" to encompass digital content as long ago as 1987, made a further change in 2011 to modify how instructional materials were purchased by districts. That same change, introduced by the Texas legislature, also addressed how districts could pay for the acquisition of technology and technology-related services.

Previously, the state would review potential textbook materials and put those approved onto an order list. Districts could order anything they wanted from the list for as many students as they had and the state would pay for the purchase. The state also paid a technology allocation of about $30 per student to the district. The fund could be used to purchase "electronic textbooks" or other classroom technology and pay for training people involved in student learning on the use of digital content.[24]

In 2011, with Senate Bill 6, the legislature changed its instructional materials funding process and eliminated the technology allotment. Districts would receive an Instructional Materials Allotment, which granted school districts more discretion over how they spent their dollars.[25] The district is expected to use the allotment to pay for content—whether in printed or digital form—as well as professional development and technical support to keep the devices and networks working.[26]

The state still reviews textbooks, both printed and digital, and districts can still order off of that approved list in order to ensure that the materials they use address the essential knowledge and skills set forth by the State Board of Education. But now the districts pay for those materials out of the funds they receive from their allotment. Currently, digital content makes up 30 percent of the orders for instructional materials by districts.

As a result, many districts are choosing to purchase classroom sets of textbooks rather than textbooks for each student. Because the legislation was approved so close to the adoption time, nearly all districts chose state vetted materials. However, the Texas Education Agency expects that with time districts will increasingly select non-state adopted materials and invest the funds in new technology and related services.

The state also set aside $10 million for a technology lending program, designed to help districts provide computing devices to students who had no access at home.[27]

A point to note: Beyond the adoption of digital content in the classroom, schools, districts, and states are finding they need some way to house and distribute the content of all kinds and to foster

Lincoln Junior High

Lincoln Junior High in Indiana adopted laptops in 2010 for all 580 students. To cover the cost, the school received an initial grant to implement content for math online and held off on adopting textbooks in math and social studies, which cut textbook costs in half, according to principal Dan Funston.

Shortly after getting their computers, according to coverage in the local newspaper, "Students already were making movies and videos with iLife, a suite of software programs, or looking for interactive adventures in math through http://coolmath.com."

Calling digital textbooks "the future of education," Superintendent Dan Tyree notes that they're "easier to update than a printed textbook and they're cheaper to produce."[28]

collaborations among educators. To address this aspect of digital content, the Texas Education Agency introduced Project Share, an online community for teachers to collaborate, research, and share resources. This community is available free to all educators in the state. The TEA contracted with The New York Times Knowledge Network and Epsilen, a learning management system and e-portfolio development company. Texas is using the Project Share portal to accumulate digital content, organize it, and distribute it, and to encourage teachers to use digital content. Through a login process, the system customizes access to resources for 300,000 teachers and administrators and 4 million students across the state.

Besides the New York Times Content Repository, the portal provides programming from a number of other resources, including PBS, McDonald Observatory, NASA, and the Smithsonian. The state is also using Project Share to house electronic copies of instructional materials that have been adopted in the state, primarily digital versions of printed textbooks. To gain access to the content, teachers log in and find it online. That's where they also gain access to professional development materials, including text, video, and audio. All this content is free to school districts.

The philosophy followed by the state is to clear hurdles standing in the way of local adoption and let individual districts and educators make decisions. Districts are free to spend their content and technology funds as they decide, as long as those investments fit the state-managed criteria and are specifically tied to student learning. Teachers are given resources for self-help in becoming conversant with new methods of instruction and the use of digital content in the classroom. Commercial digital content is licensed statewide for use by educators and students. Project Share also may eventually become a major repository of open digital content accessible by educators inside and outside the state.

Utah: Leveraging Open Content

If there's a geographic center to the K-12 open educational resource (OER) movement in this country, it's surely the state of Utah. Utah's approach to instructional materials is for the state to make recommendations but to leave ultimate decision making to the district. To that end, in January 2012 the Office of Education announced that it would support development of "open textbooks" in key areas, including language arts, science, and math. The Office of Education also said it would encourage districts and schools throughout the state to consider adopting them beginning in fall 2012. That encompasses 275,000 6th through 12th graders in public school.[29]

The state of Utah sets statewide technology goals, such as a 1-to-1 ratio of computer/tablet/handheld device to student and "adequate bandwidth and network connections for reliable student and educator access," to guide policymakers and educators. Utah's Instructional Materials Center recommends textbooks and other forms of curriculum to the Utah State Office of Education. The result of that work appears in an online state database that educators can sort by publisher, subject, category, course, and adoption action, such as "Recommended Teacher Resource." However, neither body mandates the use of the content in its public schools. The state's adoption process is to provide a general list of approved materials, but ultimate decision-making rests with local education agencies.[30]

If there's a geographic center to the K-12 open educational resource movement in this country, it's surely the state of Utah.

In 2001 the Utah State Textbook Commission changed its name to the Utah State Instructional Materials Commission to reflect its interest in emerging digital and multimedia formats for these resources. It has been evaluating materials in these formats through an annual review process since that time. That process of state recommendation and local decision-making will be maintained as Utah shifts into the use of digital and open content.

The decision to promote OER on such a broad scale comes after two years of a pilot project in creation and use of OER textbooks for science. The development of these textbooks was led by David Wiley, a faculty member in Brigham Young University's School of Education. Each pilot was conducted by the Utah Open Textbook Project, a partnership involving BYU, Nebo School District, and the Office of Education.

The content of the textbooks will be produced by Utah educators and will be housed on the CK-12 platform. The CK-12 Foundation is a nonprofit specifically founded to produce and support free and open source K-12 materials aligned to state standards. All textbooks—called "flexbooks"— available through CK-12 are free, available online, and customizable; they're licensed under the Creative Commons Attribution/Non-Commercial/Share Alike 3.0 Unported (CC-by-NC-SA) License.[31]

Currently, the work of CK-12 focuses on middle school and high school Science, Technology, Engineering, and Math (STEM) subjects; but Utah will be using the platform for support in K-6 and language arts as well.

The Open Textbook Project envisions a district paying its best teachers to work together revising and adapting the initial open textbook to meet specific needs. This custom book would contain a teacher's edition, instructional supports, explanations, text, practice sets, and assessments. Each summer teachers would invest a small amount of additional time to update the book as needed. As each new version is readied, the district could distribute the digital content in common standard formats that include PDF, ePub, or HTML; or the district could choose to print out a sufficient quantity on demand and give each student a copy that can be written in, highlighted, and kept, which makes the transition easier for those districts where student computing device availability is limited.

Adopting open educational resources, paying a team of four teachers to update the material each year at $30 per hour for a total of 60 hours, and adding printing would cost about $152,000 or $5 per student per year.

The cost comparison is dramatic. The Open Textbook Project provides a calculator that allows the district to estimate its savings compared to its current textbook scenario. For example, if a district is spending $80 per printed textbook for 5,000 students and uses it for six years, that's an investment of about $400,000 or about $13.33 per student per year. Adopting open educational resources, paying a team of four teachers to update the material each year at $30 per hour for a total of 60 hours, and adding printing would cost about $152,000 or $5 per student per year.[32]

Could a $5 textbook really compare to an $80 one? Wiley and his fellow researchers found in a limited experiment that Utah high school students learned the same amount of science in classes using the open textbooks as they did in classes using the traditional textbooks.[33] Beyond cost

considerations, the research team noted that "OER [allows] teachers and students to remix content in locally meaningful ways, to share a variety of types of learning resources, and to enable the best resources for teaching a specific topic to be more easily found."[34]

Virginia: Thinking Beyond Textbooks

Discussion about the broad adoption of digital content can't be separated from consideration of technology upon which to use it: Teachers and students need ready access to technology devices in order to take advantage of its benefits. But what drives schools and districts to invest in devices in the first place may not be digital content but something else. That was the case in Virginia, which has a long history of fostering innovation in the use of educational technology. In 2000, for example, the state began shifting its high-stakes assessments (known as "Standards of Learning") online. In 2011 it issued 2.1 million tests online—twice as many as any other state.

In 2004, the state launched "Virtual Virginia," an online program to deliver advanced placement and other courses to students. In 2005, it created a network of instructional technologists to help teachers integrate technology into their classrooms more effectively. The State Department of Education was an early contributor to iTunesU. It also collaborated with the Professor Garfield Foundation to create digital resources for the "Infinite Learning Lab," to help students with life skills, such as peer pressure, self-esteem, and cyberbullying, as well as language arts topics.

In 2008 the Department undertook a number of initiatives to explore the use of wireless mobile technologies to support and enhance teaching and learning. Those included multiple programs that tested the use of iPod touch devices and laptops.[35]

In 2009 Virginia adopted its first digital textbook for high school physics. Titled, *FlexBook: CK-12 Physics, 21st Century—A Compilation of Contemporary and Emerging Technologies* and published under an open license with the support of the CK-12 Foundation, the book is available to any teacher to use, share, and adapt at no cost.[36] The adoption occurred after a team of scientists and engineers concluded that the state's existing instructional materials were very dated. The textbooks then in use talked about cathode ray tubes, for example, with no mention of newer technologies, such as LED, LCD, or plasma displays. Neither organic chemistry nor nanoscience were referenced.[37]

Discussion about the broad adoption of digital content can't be separated from consideration of technology upon which to use it: Teachers and students need ready access to technology devices in order to take advantage of its benefits.

Those earlier initiatives have helped districts address the infrastructure needs of schools, enabling them to support the use of digital content. And they have helped educators become more comfortable and familiar with the use of technology in learning, preparing them for the fuller integration of digital textbooks into their daily curriculum.

In 2010 "Beyond Textbooks" was launched to access, organize, and deliver high-quality content using a variety of tools and platforms (including the iPad) and to understand the conditions necessary for successful implementation in schools. Fifteen classrooms provided iPads to their students. Then the state invited publishers, content providers, technology companies, and others to submit resources for use at no cost.[38] As Office of Educational Technology Director Tammy McGraw

explains, this pilot effort was unique in that it was just as much an experimental process for the providers as it was for schools. Participants worked aggressively with participating companies to figure out how digital content could best exploit the new platform and helped shaped what was ultimately delivered. [39]

Henrico County Public Schools

In order to encourage development of lesson plans and digital content by its own teachers, Virginia's Henrico County Public Schools each year hosts an annual competition in which it solicits submissions to "Henrico 21," a public digital repository. The submission must have multiple components: a lesson plan, a rubric, student handouts, links to essential resources, and a student work sample created through the lesson. Lessons have to be vetted first at the school level through a site-based team review. That same team also provides feedback to teachers and makes recommendations for moving lessons onto the division level. The content added to Henrico 21 is licensed under a Creative Commons license, which allows it to be used by other teachers, schools, and districts inside and outside the state.

Currently, the site hosts between 200 and 300 lessons. They can be searched on by grade level, subject, tag, winner standing, application to development of a 21st century classroom, and other criteria. Individual entries can be star rated and commented on.

Winning entries generate recognition for the teachers who submit the lessons. They're publicly acknowledged as "experts" at a special ceremony, which is funded through donations and grants from vendors and nonprofit organizations.

What the division aspires to is building a repository that allows an instructor to access any lesson from any source—commercial or internally made. That in turn would be tied into the student information system, to enable a teacher to identify specific digital content that would be most appropriate to any given student with a specific learning gap.

Henry County Schools, one of the participating districts—or "divisions" as they're called in Virginia—started with 40 tablets used in 2 classes and has since grown usage to 3,000 students. Now every third, fourth, and fifth grader has access to a tablet at school and at home. The device contains digital math and social studies curriculum as well as other apps selected by individual teachers. Although the initial investment for the program came primarily from grants and stimulus funds, the division itself has invested its own resources to expand the initiative based on the student success it was experiencing.

Most recently, in August 2012, the Department of Education teamed up with public and private organizations to release two "interactive digital textbooks" for teachers to consider using in required high school courses on finance and economics. The "books" contain 2,600 pages worth of digital content: graphic-novel scenarios, interactive activities, graphing tools, embedded review questions, and self-grading quarterly and final assessments. To recoup development costs, the Department of Education is selling iPad editions of the books in the Apple iBookstore; however, the state is also making free PDF versions available, which lack the interactive elements.[40]

Like the state of Indiana, Virginia is using funding judiciously to help seed new projects in the digital content space. But unlike Indiana, the money isn't going only to those schools that are already on a fast-track.

"These pilots help shape better offerings," McGraw says. "We don't have all the answers, but I think there is tremendous value in establishing pilot projects that spur innovation and help us better understand the technological, social, and policy challenges that schools face as they transition to digital content. Schools clearly benefit from what we learn, but I think we also help shape better products and resources for schools."

"I think there is tremendous value in establishing pilot projects that spur innovation and help us better understand the technological, social, and policy challenges that schools face as they transition to digital content," Tammy McGraw, Office of Educational Technology Director.

Actions in Other States

By no means are these the only states testing out new digital content projects or fine-tuning existing programs. Pilots exist in almost every state. Although only some of the initiatives may appear bold, multiple government and education agencies, foundations, nonprofits, academics, private enterprises, and individuals are pushing the work forward from multiple sides.

A high-level look at select actions in other states can be found on the pages below and is summarized in an exhibit on page 25.

Alabama: The legislature has passed a bill to provide computing devices and digital textbooks to high school students, to be paid for with $100 million in bonds. While the bill passed and was signed by the governor, funding has been delayed until an advisory committee submits a plan for its implementation. Funding is expected in 2013.

Arkansas: In March 2011 Act 288 amended Arkansas Code 6-21-403 to include digital resources, alongside textbooks and other instructional materials purchased with state funds, to be made available to students.[41]

California: In May 2009 then-Governor Arnold Schwarzenegger implemented the "Free Digital Textbook Initiative," which called for submissions of free, OER textbooks for high school math and science. The California Learning Resource Network coordinates the review of digital content for adherence to state standards.

Florida: The state has begun a five-year transition to digital instructional materials. By the 2015-2016 academic year, districts are required to be ready to expend at least half of their instructional materials allocation on state-adopted digital materials; districts retain flexibility in how they spend the remainder of their allocations. State legislation also addresses multiple aspects of the transition: development and implementation of digital content for students in grades 6 through 12; designation of pilot programs for the transition to digital content; and electronic review and evaluation of instructional materials meant for adoption (and even prohibits the submission of hardcopy samples).[42]

Georgia: After enacting legislation to allow schools to use textbook funds to purchase hardware to support digital content, in 2010 the state of Georgia spent $13 million to begin pilots to test the use of digital content. Legislation was passed in 2012 to allow students to maximize online learning

opportunities by taking online courses for no charge. This legislation also allows districts to keep their "full-time equivalent" funds and pay for an online course through the Georgia Virtual School or any other state-approved online provider where the cost doesn't exceed $250 per half unit of credit.

Idaho: Students Come First, Senate Bill 1184, passed this year to create a funding formula for instructional technology and professional development for teachers. While implementation issues have arisen, the intent of the law is that all high school teachers will be outfitted with mobile devices in 2012-2013; all high school students will have them by 2015-2016. The state will cover device expenses; districts will determine their use. A Department of Education taskforce has recommended the use of digital OER through several services, including Khan Academy and Curriki.[43]

Federal Support of Digital and Open Content

While K-12 instructional materials decisions are the purview of states and districts, the federal government advocates for digital and open content by encouraging its use and by requiring or incenting its inclusion as a component of select grant programs.

Two national plans crucial to education—the National Education Technology Plan, "Transforming American Education: Learning Powered by Technology," and the National Broadband Plan, "Connecting America"— provide recommendations focused on digital and open content. The National Education Technology Plan, for example, recommends that entities support the development and use of OER and participate "in efforts to ensure that transitioning from predominantly print-based classrooms to digital learning environments promotes organized, accessible, easy-to-distribute, and easy-to-use content and learning resources." The National Broadband Plan is no less ambitious: "The US Department of Education should consider investment in open licensed and public domain software alongside traditionally licensed solutions, while taking into account the long-term effects on the marketplace."

A typical example of a program requirement in a grant program was in the US Department of Education's Race to the Top Fund, where all work developed under the grant that was not protected by law or agreement had to be made freely available to others. The Race to the Top Assessment program took this requirement a step further by expressly stating that the assessment content developed under the grant be made widely available, "including to States that are not part of consortia receiving funds under this competition as well as to commercial organizations..." Other recent examples can be found in other US Department of Education programs, which included competitive grant priorities in support of OER, including for Strengthening Institutions, Investing in Innovation (i3) Fund, and Upward Bound.

Perhaps the most prominent example of federal support for OER, however, is via the Department of Labor's Trade Adjustment Assistance Act Community College and Career Training Grant Program for which recipients must license all of their program output under a Creative Commons CC BY License.[44] The Department of Labor will create an online public repository for all these materials, making them even more accessible.

Illinois: In 2010 legislation was enacted to expand the definition of textbooks to allow for the use of digital content and the equipment necessary to use it. Senate Bill 3547 also expanded

textbook funding sources to include those same materials. Along with eight other states, Illinois is participating in a Shared Learning Collaborative project to implement a systematic approach to curriculum resource alignment with CCSS and focused on personalizing learning for students. The goal: to link instructional data to "high-quality and diverse sets of curricular resources, so each student gets what he or she needs most at that moment in time."[68]

Iowa: Senate File 2178, signed into law on March 22, 2010, expands the definition of "textbooks" to include books, electronic materials and laptop computers, or other portable personal computing devices. New policy has changed the definition of a textbook to include digital content and to allow textbook funds to be used to purchase technology.

Louisiana: Since 1999, the state definition of textbook has included "electronic media." However, with the passage of SB533 in 2010, the State Board of Education was directed to make every effort to ensure that electronic versions are available for every title it approves in the textbook adoption process. In addition, the Department of Education was directed to clearly communicate its desire to increase the availability and accessibility of electronic textbooks and instructional materials.[45] In April 2012, dated policy language that specifies districts expend "90% of the *state textbook allocation* on state approved material" was removed (There has been no state textbook *allocation* since 1992-1993). The policy change doesn't increase the amount of funding to local education agencies (LEAs), but it does empower local budgetary decisions through greater flexibility in spending.

Maine: In 2002 the state started a comprehensive middle school 1-to-1 program; about 55 percent of high schools in the state were added in 2009. In 2011 related legislation, Title 20-A, was passed, which accomplished two ends. First, it called for development of a program of technical assistance, including professional development and training, for educators to learn how to use online learning resources, including OER. Second, the law created a digital literacy fund for covering the expenses of developing online learning resources and building a new clearinghouse for information on the use of online learning resources.[46]

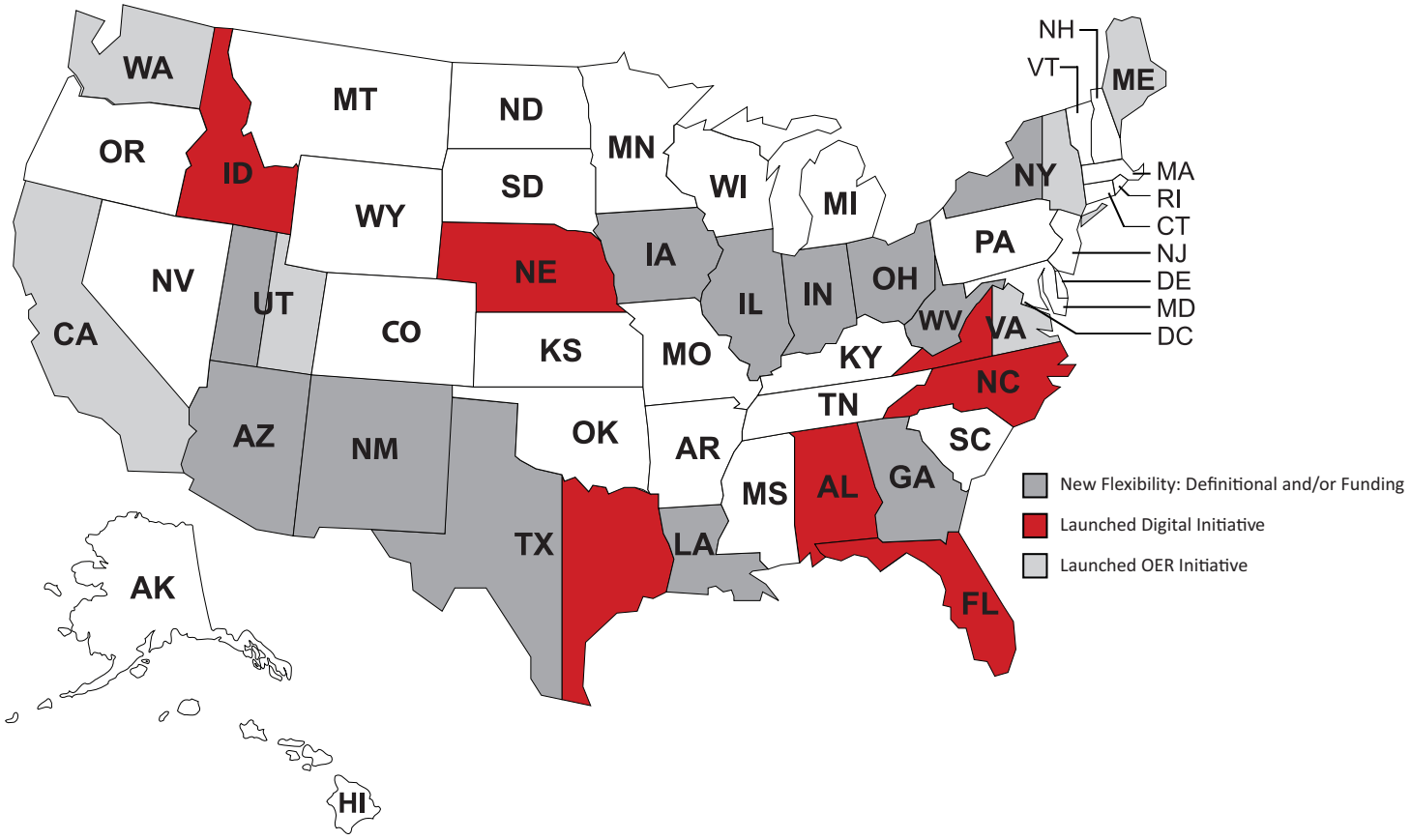
Maryland: State law recognizes the importance of high quality digital content for use in schools. The MDK12 Digital Library Program, a partnership of the State Department of Education with every school district in the state and about 100 nonpublic schools, negotiates statewide pricing for the purchase of digital content to provide quality resources for students at all grade levels.

Nebraska: In mid-August 2012 the Department of Education launched the NeBook Project, a partnership of schools, state, and nonprofit agencies to create digital books, assess their quality, and share them through a new virtual library that will also host content from multiple resources, including PBS and the National Archives. The digital books will be created on Apple's iBook Author for viewing on the iPad; they'll also be available in PDF format.[47]

New Mexico: HB 310, passed in 2011, requires publishers to provide instructional material in an electronic format for e-readers, beginning with the 2013-2014 school year.[48]

New York: Sections 701, 751, and 753 of New York State Education Law were amended for 2011-2012 to provide flexibility in the use of instructional materials aids. These included textbooks, library materials, computer software, and instructional computer hardware. The new provisions first apply to 2011-2012 expenses for 2012-2013 aids. If a school district spends more than its

State K-12 Textbook Policy Innvovation



maximum allocation in any one of the areas, the excess expense over the maximum allocation can be designated as expense for aid in one or more of the other categories, even if the district didn't actually make purchases in those categories. New York also has created Requests for Proposals for instructional and professional development materials for Common Core-aligned English/Language Arts and Mathematics content. In the RFP there is a preference for the materials to be licensed under a Creative Commons license.

North Carolina: The state eLearning Commission in 2011 and 2012 put forth a set of recommendations to transition to digital resources as the primary form of educational materials in K-12 schools over the next five years, recommendations that have been approved by the governor and the State Board of Education. The Commission promoted starting with math and English language arts as part of the state's move to the CCSS, including working with other states on development of OER.[49] The proposed plan builds upon the state's commitment to building a K-12 cloud computer infrastructure to support its digital initiatives.

Ohio: The state's administrative code 3301-92-01 refers to "textbooks and instructional materials," including instructional software and computer hardware. Code 3329.08 references textbooks and "electronic textbooks." In March 2011, HB 30 repealed a textbook "set-aside fund" requirement specified in Section 3315.17 for its public schools. With the repeal, public districts are no longer

required to have such a fund. Also, language in HB 153, which applies specifically to nonpublic schools, was updated to encompass similar definitions and regulations, including the term, "electronic textbook."

Washington: The 2012 state legislature passed Engrossed Second Substitute House Bill (E2SHB) 2337, which provides $250,000 to the Office of Superintendent of Public Instruction (OSPI) related to developing a library of high-quality, openly licensed K-12 educational courseware that is aligned with the newly adopted CCSS for English language arts and mathematics.[50]

West Virginia: SB 631, passed in 2010, replaced the terms "textbooks," "instructional materials," and "learning technologies" with "instructional resources" and revised the definition to include digital content. In 2011 the Department of Education implemented a two-year hiatus on the purchase of social studies textbooks and reallocated the funds to educational technology infrastructure upgrades as part of a transition to the use of digital content.[51]

Lessons Learned

These efforts differ in scope and detail, but they all encourage the movement to more digital content in schools. A first step is to include digital content as a part of the definition of instructional resources or textbooks. While minimal, that step is necessary. Other states have freed up the funding mechanisms to include not only digital content, but also the technology necessary to take advantage of the digital resources, or otherwise provided greater flexibility in the use of instructional materials funding. A handful of states focus on finding and leveraging OER. A few states have even larger visions that put digital content at the core of their effort. In other words, a continuum of policy steps exists on the way to fully embracing digital content.

A first step is to include digital content as a part of the definition of instructional resources or textbooks.

Policy change can be initiated from many places in the overall state educational structure. These states profiled here, from very different regions of the country, are driving a strong push from print to digital content and, particularly in the case of Utah, toward OER, yet there are differences among their efforts. One notable difference is the impetus for the changes from a traditional approach to one that is more innovative:

- In Indiana, the change was initiated by a State Board of Education unhappy with the social studies materials that had been proposed. The State Board changed the definition of a textbook to include digital content, allowed textbook funds to be used to purchase technology, and encouraged districts to use a waiver process to access that capability. The Superintendent backed that effort and even granted districts a blanket waiver.
- In Texas, the legislature has taken the lead in implementing changes since it first revised the law to allow digital content in 1987.
- In Virginia, the Department of Education has taken the lead in many of the projects, although the physics FlexBook was a joint project between the governor's office and the Department of Education.
- In Utah, the State Office of Education has played a lead role, but it was based on the research and leadership from a faculty member from Brigham Young University.[52]

In all cases, the legislature has ultimately backed the changes, either by changing the laws to support the initiatives or by funding them—and many also have benefited from the support of the governor. Indeed, the point being made here is that there is no one best way to implement and drive change in this area, but that state level leadership is critical for progress.

More important than the differences are the similarities among these leading states and the real lessons to be learned.

SETDA to Launch State Education Policy Center

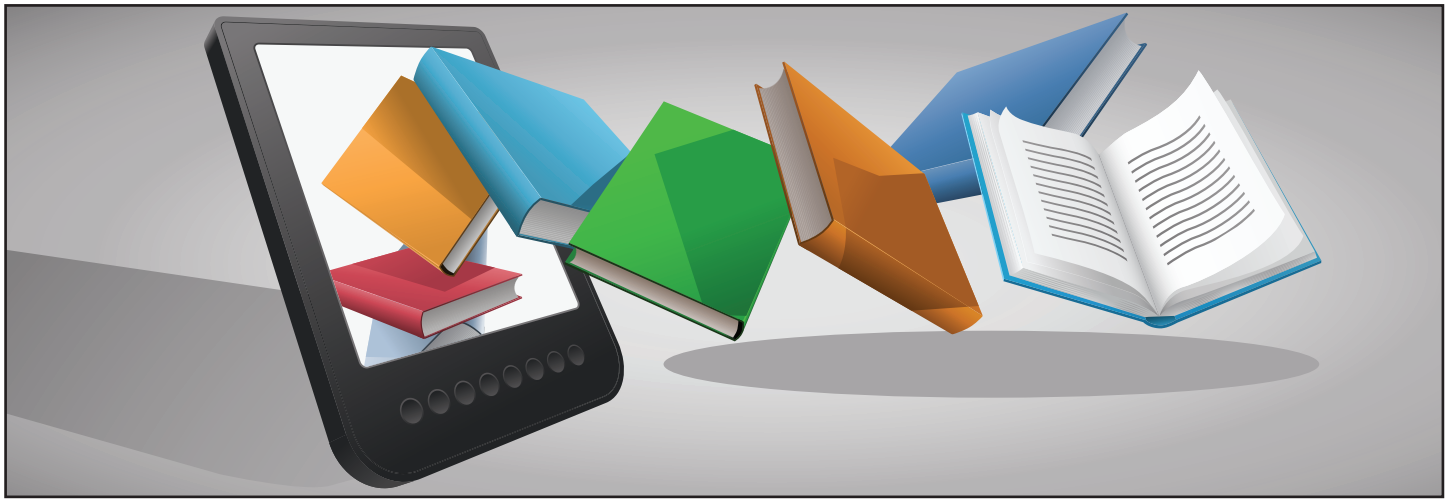
In fall 2012, SETDA will launch the State Education Policy Center (SEPC), a database of state policies related to education and technology. One of the first topics included in SEPC is digital content. Once the resource has been made public, SEPC users will be able to view all policies related to digital content on a state-by-state basis. They'll be able to select a sub-topic such as "definition of textbook" and view the definitions of textbooks in all states.

- **Strong state leadership.** As noted above, the impetus for change can come from anywhere at the state level, but the message of the desire and need for change was strong in these states and coordinated among various branches.
- **A culture of innovation.** Each of the states profiled is trying to foster a culture of innovation through different mechanisms. Virginia is seeding a variety of projects from school districts and working with the private sector. Indiana is focusing on those districts willing to take risks so they can go even further, "helping people who are running fast run faster..."
- **Increased flexibility in funding.** All states had an eye on funding and the most common approach for easing districts' financial burden was to provide greater flexibility in how they used their dollars. Also, as illustrated throughout the state thumbnail sketches, the flexibility in funding broadens the definition of textbooks to include digital content; many states allow districts to use "textbook funds" to purchase the technology needed to access the digital content.
- **Increased flexibility in content choice.** In many states, the so-called adoption states, control of the primary materials used for instruction has rested at the state level. Both Texas and Indiana have changed their role to one similar to Utah's, producing an advisory list that districts can use for advice but aren't compelled to follow. (Although Indiana has not loosened the reins completely; reading content still must be state-approved for some school corporations.)

There is no one best way to implement and drive change in this area, but state level leadership is critical to progress.

- **Strong implementation.** In some cases, the best laid plans for policy go awry in implementation. These states have taken extra steps to ensure that the policies passed at the state level get supported so that they're implemented at the local level. Texas and Indiana have both set up mechanisms for teachers and other innovators to share and support each other. In Indiana it's a series of calls, webinars, and professional learning networks. In Texas it's leadership at the local level and a statewide, online community in Project Share.

Success Factors for Making the Shift to Digital Content



Scaling up the use of digital content does not happen with one sweeping gesture. Policymakers and district leaders need to consider several interrelated factors in moving from a textbook-based world to one that is digital. While the factors and their individual importance may vary depending upon where states and districts currently are on the path to digital instructional materials, the following are integral to success:

- Sustainable funding for devices
- Robust internet connectivity
- Up-to-date policies
- Prepared educators
- Intellectual property and reuse rights
- Quality control and usability
- State and local leadership buy-in

Addressing these factors in an interconnected way and looking at how one factor influences others will help ensure a smoother transition.

Sustainable Funding for Devices

Funding for technology, especially devices, is not a new concern for states and districts. Most districts have been outfitting teachers and students with computers for years. The student to computer ratio has hovered around 3.75 to 1 for a long time, although no surveys have been done recently to account for the burst of purchases of tablets and other devices. What's new to many states and districts is increasing that ratio much closer to 1-to-1. While digital content can be implemented successfully with a less advantageous ratio than 1-to-1, in order to take full advantage of what digital content can bring, each student needs to have a device fully accessible, in school and out of school.

Addressing these factors in an interconnected way and looking at how one factor influences others will help ensure a smoother transition.

Money for schools is tight, so it may seem odd to suggest the implementation of technology and 1-to-1 programs for digital content. However, a robust system of technology, including broadband, devices for students and teachers, and appropriate technical support has multiple benefits that can help districts in other ways that can make the cost side more achievable. For example, the technology system can be used for more effective professional development, higher quality teaching and learning, more efficient assessment with much more responsive results, and more efficient school operations. No longer are any of these functions isolated from each other.

Figuring out the cost for a 1-to-1 student-to-computer ratio can be a difficult task, as there are costs for the entire ecosystem of technology, including professional support, data collection, teacher training, systems for assessment, and infrastructure needs. The expense of many of these components may not be as visible as the price of the device itself. On the other hand, schools generate savings by leveraging content across grade levels and subject matter. Plus, the devices can be used for a wide variety of purposes, creating efficiencies and time savings as well. As reported in the "Digital Textbook Playbook," circulated by the Federal Communications Commission and the Department of Education in the spring of 2012, "the reported cost for 1-to-1 implementations range from $250 per student per year to more than $1,000 per student per year, measured on a four-year refresh cycle." But the same guide reports that cost savings related to going digital are estimated at close to $600 per student per year when a number of factors are taken into account, including savings possible with digital vs. print materials.[53] Jeff Mao, Learning Technology Policy Director in Maine, said that Maine allocates approximately $285 per student per year for its 1-to-1 program that includes a laptop, technical support, professional development, and warranties.

As textbook funding evolves into funding the purchase of excellent content in any form and the technologies necessary to work with it, schools are converting "book dollars" into "device dollars."

The pricing of devices also varies over time; sometimes the cost stays constant even as new features and functions are added; other times it goes down even with new features. The exception to this flimsy rule is when a new category of device is created, such as the tablet. Currently, tablets, particularly the iPad—not laptops, nor netbooks, nor smart phones—dominate the conversation in education. According to the Smarter Balanced Assessment Consortium, which is one of two state-led organizations developing next-generation student assessments, the number one question it receives from school districts is whether or not the iPad will be an acceptable device upon which to take the new online tests, once they're released starting in 2014-2015. This reflects school districts' interest in using these devices for instruction as well as assessment. Some school districts are looking at differentiating devices either by function or by grade level in order to save money. Thus, they might have tablets in the elementary schools and laptops in the high schools. No matter the approach, portability and flexibility have moved up on the priority list for school districts acquiring devices.

Districts and states are taking different approaches to ensuring funding is available for technology. As textbook funding evolves into funding the purchase of excellent content in any form and the technologies necessary to work with it, schools are converting "book dollars" into "device dollars." Overall, with wise implementation, the expense can even out. As noted earlier, many states have changed the definition of textbooks to include not only digital content, but also the technology to

epic-ed: A New Community of Practice

One source for educators to learn about technology-enabled learning initiatives is epic-ed (www.epiced.org), a national online community of practice, which launched in late August 2012. The initiative is part of the national Connected Educators Project, funded by the US Department of Education. The community website is maintained by the Digital Learning Collaborative at the Friday Institute for Educational Innovation at North Carolina State University and the Consortium for School Networking.

The site expects to provide community resources organized around a process for planning and implementing 1-to-1 computing, BYOD, and ubiquitous computing. It features events, resources, discussions, and news aggregated around three main phases of planning and implementing technology-enabled environments: vision, planning, and implementation, with areas of focus for teachers, administrators, instructional technology staff, and IT leaders.

use the digital content. This additional flexibility not only frees districts to purchase different content and technology, it also changes the mindset about categorical funding. Dan Funston, principal of Lincoln Junior High School in the Plymouth, Indiana School Corporation, says, when referring to the change in law regarding definition and use of textbook funding in Indiana, "The change in that rule gave us the confidence and momentum to go forward to 1-to-1."[54]

Bring-your-own-device (BYOD) is another strategy that school districts are beginning to implement to save money by taking advantage of the technology many students already have at home. Any planning for BYOD must also include a means to provide technology to those students less able to afford it. Texas implemented a $10 million program for a technology-lending program designed to help districts overcome the digital divide and provide computing devices to students who had no access at home in an attempt to encourage BYOD programs in districts.

Robust Internet Connectivity

Closely related to the funding of devices is ensuring sufficient broadband in schools. As discussed in SETDA's 2012 report, "The Broadband Imperative: Recommendations to Address K-12 Infrastructure Needs," schools (and students' homes) need reliable, robust broadband wireless or WiFi connectivity to implement a rich digital learning environment. Although much digital content can be accessed offline or without internet connectivity by having it stored on the devices in use, successful implementation calls for a seamless flow between online and offline resources to encourage internet research, multimedia streaming, online assessments, and interactivity within digital materials.

The use of digital content calls for ample amounts of broadband that can support social media and video activities taking place in the classroom at the same time that a full grade of students is going online to begin their high-stakes testing.[55]

The network delivering that internet connectivity needs to be foolproof. As many districts have discovered, when teachers stop trusting the network, they often put away the devices and revert to traditional teaching methods that require no digital content at all.[56]

Planning for and implementing a network and internet infrastructure sufficient enough to enable pervasive use of devices will also support the streamlining of many other areas of district operation, including administrative applications being hosted in the cloud and moving to online-

based professional development.[56] As "The Broadband Imperative" makes clear, broadband is crucially important for all aspects of the education enterprise, and districts need to plan for more simultaneous users accessing their networks for multiple purposes as time goes on.

Up-to-Date Policies

Nothing dramatic will happen in a state or a district until policy catches up to and reflects the aspirations of leaders at the state and district levels, and many teachers in the classroom move forward on digital content.

A forum of the National Association of State Boards of Education (NASBE) in 2009 examined the state role in the adoption of instructional materials. The forum's conclusion: States and nontraditional publishers could "unleash innovation—if only state instructional materials policies were revised to take better advantage of technological and copyright innovations."[57]

Nothing dramatic will happen in a state or a district until policy catches up to and reflects the aspirations of leaders at the state and district levels and many teachers in the classroom to move forward on digital content.

In every state that has made a big push for the use of digital content in schools, legislators have had to update how their states legally define "textbook," "instructional materials," and similar terminology in order to encompass the use of other kinds of educational materials. While this kind of legal maneuver will rarely generate the same kind of headline attention that other education-related topics do, it heralds reform like the first flowers in spring.

Extracting the conventional definition of "textbook" out from under education regulations is often the first step in adjusting textbook-related control structures that may have served a purpose at one time but now have little merit. These include:

- **Checklists and readability formulas followed by many states in their textbook review process.** Checklists guide reviewers through the process of ensuring that a specific textbook fits state criteria. Critics of the checklist say that it's simply a shortcut that confirms the presence of specific keywords without the need to actually read a book for "quality, accuracy, or content." Readability formulas, which count the numbers of syllables in words and the number of words in sentences, have, according to opponents, "dumbed down" content.
- **Practices that prevent small publishers from fully competing in the marketplace.** Often only the largest publishers are able to make appearances before textbook review boards or otherwise accommodate district- or state-specific textbook review stipulations (such as providing x number of prototype books for reviewers). These entrenched practices may prevent small publishers that may have very high-quality content from making their content available to school districts.
- **Secrecy around curriculum reviews,** such as highly influential reviews submitted by reviewers who do not need to identify themselves.
- **Hurdles that prevent individual districts from using funds,** local or state-provided, to acquire the content they feel is appropriate for their students.
- **An old business model that created a purchasing structure of one textbook per student,** per subject area, per grade level and that doesn't allow for the acquisition of smaller discrete "chunks" of content.
- **State control via a vetting and adoption process,** of what content is "allowed" to be acquired. As noted earlier, more states are decreasing state control of the content districts can spend state

money on. Frequently, less state control is also accompanied by less state funding. The trade-off of greater accountability for results with more flexibility on the means to attaining the results is one embraced by more and more states and districts.

Prepared Educators

Some districts have implemented a large amount of technology and digital content with the "learn-by-doing" approach, believing that teachers will discover the best uses of the technology by experimenting and learning from students. Most programs that have made the successful move to the use of digital content, however, have done so after giving their teachers a school year's worth of preparation. That seems to be an optimal amount of time to let educators become comfortable using the computing devices themselves, learn how to integrate digital content into their lessons, and work with cohorts to begin restructuring lesson plans and teaching materials. Others will implement the technology by grade level or subject area to focus on small successes and create best practices within the school or district.

The newest generation of teachers will also drive the adoption of digital content in the classroom. Some colleges of education are putting much greater emphasis in their programs on helping pre-service teachers understand how to integrate subject content and teaching practices with the use of technology. For example, the Iowa State University School of Education offers a "digital learning" minor to prepare its students "to be leaders in the field of educational technology."[58] The University of Rhode Island School of Education offers a course for educators specifically covering "eBooks and Digital Content."[59] Education programs have come to recognize that they need to help their students effectively identify and use resources such as digital content that are applicable for the classes they'll teach.

The opportunity that comes with these changes is that experienced teachers often find themselves energized by the changes. As one researcher reports, "People worry that older teachers won't want to get engaged, but if you present it correctly and have great teachers to model and help them, they can become revitalized. Our teachers have bought in. They've gone from being scared of their computer, to talking about postponing their retirement because they're having too much fun. They have a great attitude about coming to work."[60]

Educators also can use their devices to further their own education, by streaming professional development lessons and collaborating online via voice, text, and video with peers in formal and informal learning settings.

Intellectual Property and Reuse Rights

In spite of the virtual nature of digital content, it can suffer under the same usage constraints as printed textbook content if licensing and related matters aren't addressed up front.

The approach to resolving copyright and licensing of digital content depends on whether the content comes from a for-profit entity, such as a publishing company; a public entity, such as a state board of education; an individual educator working for the "common good"; or some other source. Considerations about copyright (or ownership) and licensing (or sharing) need to be baked into the project from the beginning.

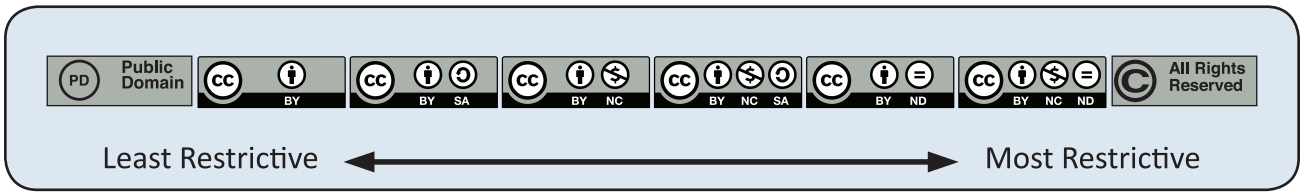
What happens if the considerations are not incorporated from the beginning? Usability will be limited. According to a 2010 report from the Southern Regional Education Board (SREB), most electronic educational resources created in the last decade by teachers and technology specialists in SREB states wouldn't be usable in classrooms outside of the "narrow groups" for which they were originally developed—not because the resources weren't good enough or required special equipment or extensive training, but because they were created without the right licensing in place. Without that, the report states, "potential users must assume the copyright holder who owns the material reserves all rights to its use." This is true even if the creator of the material would have intended just the opposite.[61] As a result, "thousands of electronic educational resources created using public funding," are frozen from being used elsewhere "because they're not legally sharable among all teachers who might benefit from them."

Creative Commons (CC), a California nonprofit, has set as its mission addressing the legal issues of making content on the internet open so that people can use it as they wish for education, research, and other purposes. The organization offers a spectrum of six intellectual property licenses that can be applied to content available on the internet by the person who created it. These licenses range from the most restrictive—people can download a creator's work and share it with others, but they can't change it in any way or use it commercially—to the least restrictive: Others can distribute, remix, tweak, and build upon the work, even commercially, as long as they credit the creator. The latter is called an Attribution or CC BY license. CC's intellectual property licenses are valid in the US and five other jurisdictions where they've been tested in courtrooms.

Most electronic educational resources created in the last decade by teachers and technology specialists in SREB states wouldn't be usable in classrooms outside of the "narrow groups" for which they were originally developed — not because the resources weren't good enough or required special equipment or extensive training, but because they were created without the right licensing in place.

Greg Grossmeier, education technology and policy coordinator for Creative Commons, advises content creators—whether it be the state, district, school, or teacher—to retain the copyrights for all content created and to apply a CC license to it so that reuse, revision, and redistribution are defined up front. "Plain language is always needed," he says. "Then as content facilitator, you can publish that work under a CC license, and that takes away uncertainty."[62]

Creative Commons is about to embark on a project to collect policies regarding open content so that states understand what changes they need to make in order to ensure that the right kind of copyright and licensing directions are followed. For example, in 2009 Utah created a rule (R277-111) specifically to let educators in the state know that they could share materials created or developed in their classes simply by using a Creative Commons license.[63] In the 2012 session, Washington State introduced a bill, HB 2336 - 2011-12, that would require the school directors' association to convene an advisory committee to develop a model policy for the open licensing of courseware developed with state funds.[64] The bill did not pass in the 2011-12 legislative session, but other states such as Virginia are considering similar actions as are different departments within the federal government.



To understand the value of a CC license, consider the spectrum of possibilities open to educators:

Public domain content has no restrictions on modification, sharing, use, or reuse. Nor is there any cost. However, authorship and origin of the material may be lost with time, since these do not have to be tied to the content. Likewise, there's no way to track modifications across versions.

CC has six licenses, which grant the content user varying degrees of use and modification rights. The content creator still holds the copyright, but hands off varying levels of control over what can be done with the content. CC BY, for example, allows students, teachers, publishers, and others to distribute, remix, tweak, and build upon the work (even commercially) as long as they credit the original author. A CC license gives the user the ability to track authorship and modifications over time. The content may be free or low cost and sustainability is determined by the user.

All Rights Reserved Copyright restricts the content user's rights to share, modify, and reuse material. Authorship and versioning over time can be tracked. The content may be free, low cost, or high cost; sustainability is dictated wholly by the content creator or copyright holder.

Quality Control and Alignment to Standards

There are multiple professed reasons for quality control, the most common of which are to ensure the materials are accurate, that they align to standards, that they are bias-free, and that they adhere to local or state laws. The process for quality control of content in the print-based, 50-year-old system however, begs for alternative models to ensure the positive qualities of digital content are allowed to flourish and those obvious lesser qualities are brought to the forefront. Even if a state or district is considering digital content, this process is improved just by the nature of the materials being digital.

Currently, every state has its own set of standards for each subject area. Review of content takes place at either the state or the district level, involving dozens of people. Digital content can go through the same type of review process if necessary, but with some definite advantages. For one, the workflow of a review process can be much more efficient since there aren't hard-copy materials to deal with and comments can be made within the content precisely at the spot where updates may be needed.

Also, once the Common Core State Standards are in place, in most states the burden for reviewing content for math and English language arts, the subjects covered by the standards, could be shared among multiple states that are still reviewing content at the state level. Distributing the work that way can eliminate duplicative efforts and streamline the review process.

In turn, those efficiencies would enable updates to content to take place more frequently. With digital content, revision cycles could be greatly shortened. One major commercial publisher, for example, expects to be able to follow an annual cycle with updates to its digital curriculum.[65] Open

content, like open source software, is continually revisable by community members. The version made available for download could be as fresh as that day's date. That would allow the teacher to work with the IT staff or with students directly to obtain the latest version of the material at the start of each new semester. The review process itself could also be shortened by virtue of having reviewers focus only on the changed content, since everything else would have been previously reviewed.

In situations where districts or schools need assurances that revisions are being done in accordance with specific policies or practices, they can "lock down" modifications to prevent further editing. This is a practice followed by Wireless Generation's FreeReading, which delivers a free open source reading program for grades K-3. Certain activities are locked and others may be created and freely revised by its community of teachers and other users.

Influencing Publishers

Schools are taking the CCSS seriously. In June 2012, the Council of Great City Schools, a group of the largest urban school districts, met and agreed on a set of "publishers' criteria" to guide the creation of instructional materials adhering to the standards. Their intent is clear: By pledging to buy or create only those materials that reflect the criteria, they've put a great deal of pressure on publishers to follow the CCSS in developing new content. A next step could mandate the availability of that content in digital form.[67]

Other approaches to quality control and standards alignment may seem unfamiliar to education policymakers and administrators, but are common for many websites in popular use around the world. For example, states and districts with a repository of digital content can implement a review or star system, akin to what Amazon uses on its e-commerce sites. Teachers who have tried the content can rate it and add notes to help guide others' choices, in a "crowdsourcing" approach. That's done with Project Share in Texas, for example.

However, the crowdsourcing approach isn't universally accepted. Vail School District in Arizona, which has an initiative called "Beyond Textbooks" that's growing statewide and features a quickly expanding repository of digital content, doesn't allow teachers to review the submissions they download. According to Director Kevin Carney, Vail has avoided the "crowdsourcing" approach for rating submissions because that could alienate teachers who are willing to share their resources. Currently, his staff reviews submissions to the repository, primarily for intellectual property issues, formatting problems, and adherence to standards.

To provide guidance in evaluation of learning objects, Achieve, a nonpartisan, nonprofit education reform group of governors and business leaders, has developed a set of rubrics specifically for judging the merits of OER. The evaluation guidance is meant to be applied to any content subject and object type, down to the "smallest meaningful unit," and covers areas such as alignment to standards, quality of explanation, usefulness in teaching, and other criteria.[66]

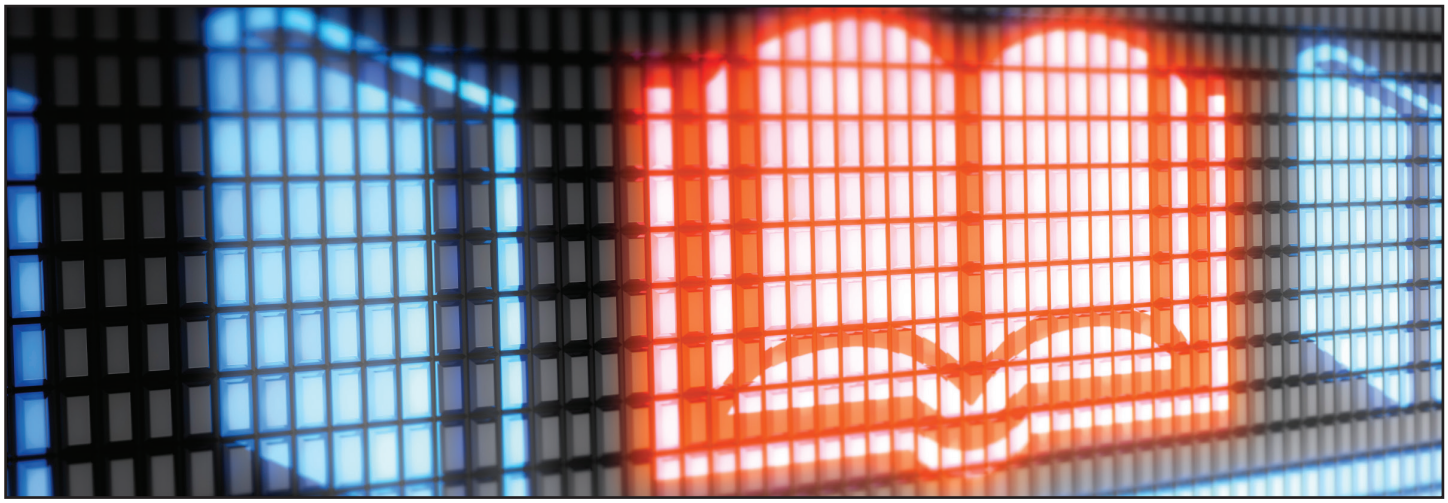
Discussions of quality control for digital content ultimately must ask, whom do you trust to approve the material—a state commission or agency, a consortium of educators from around the country, local teachers, a for-profit company that hires subject matter experts, or some other configuration? Whatever it turns out to be for a given school or district, the advantage of digital content continues to be its changeability. Bad content doesn't have to remain locked in place on the printed page until

the next edition of a given textbook is produced and distributed. The cycle for fixing problems can be much shorter and, depending on whether the content is copyrighted or distributed as OER, the fix can be simpler to make.

State and Local Leadership Buy-in

Strong and clear state leadership was highlighted earlier in this report as one key commonality among the successful states profiled. Leadership at the local level is no less important. As the "Digital Textbook Playbook" states, the most critical part of a successful digital learning conversion is strong support from top district leaders who can communicate the vision to multiple stakeholders—school administrators, staff, teachers, parents, and others—and ensure the appropriate resources are in place to carry it out. In this regard the Playbook also recommends "collaborative" leadership. As it points out, "Some initially successful conversions have failed after their leaders moved on. While individual leadership is important, collaborative leadership provides the opportunity to build a collective vision and commitment that enhances continuity."

Recommendations to Address K-12 Instructional Materials Needs



The traditional approach to developing, selecting, disseminating, and using print instructional materials in the nation's classrooms is increasingly out of sync with the ways in which technology is reshaping the wider world and the expectations of today's students and teachers. Moreover, in a time of increasingly tight budgets, many states and school districts continue to purchase both print *and* digital instructional materials in a duplicative uncoordinated fashion, with far too little attention to quality and value for money. At the same time, the open educational resources (OER) movement has opened many people's eyes to new paradigms for addressing the age-old problem of ensuring access to quality content.

SETDA believes that more states, districts, and schools need to begin taking advantage of all of the many benefits provided through digital and open content to improve student achievement and engagement and efficiently use scarce resources. Given current trends and building upon the real-world experiences of states and leading districts, SETDA offers the following recommendations for K-12 policymakers, school leaders, and publishers.

Recommendation 1: Complete the Shift from Print-Centric Textbook Adoption Practices to Digital Resources within Five Years

SETDA recommends that states and districts commit to beginning the shift from print to digital instructional materials with the next major "textbook" adoption cycle, completing the transition by no later than the 2017-18 school year. If the commitment is not made immediately, major funding will go toward providing students and teachers with static, inflexible content that will be in place for 5 to 10 years, depending upon the length of the cycle. Flexible, digital instructional resources available now and coming on the market during the cycle will provide greater opportunity to personalize learning as well as save money. The current approach of uncoordinated purchasing of duplicative print and digital instructional resources is wasteful and expensive.

Recommendation 2: Develop a Vision and Roadmap for Completing the Shift

SETDA recommends that state and district leaders establish a clear vision for the use of digital and open content and clearly communicate that vision to school leaders, teachers, publishers, technology companies serving the education community, and the public at large. The vision should look beyond textbooks alone and consider flexibility, quality, and effectiveness of all materials.

Especially important is the ability to get the most value from the resources by taking advantage of the cost-effectiveness, flexibility, and sustainability of OER. Finally, comparable shifts from print to digital are taking place across a range of core K-12 functions, including student assessment, instruction, and educator professional development, affording enormous opportunity to advance school reform and improvement efforts at a larger scale through technology. At a minimum, a roadmap for implementing the vision should include the sub-recommendations below and provide direction for educators, students, parents, and the community at large.

Recommendation 2a: Eliminate Unnecessary Regulations and Enact Supportive Policies

SETDA recommends that states, districts, and publishers re-examine and revamp all processes for the creation, acquisition, and use of instructional materials to take advantage of what digital can bring to the education sector. Many current laws, policies, and processes are outdated and hinder the effective use of digital content in schools. At a minimum, definitions of textbooks and instructional materials should allow for the acquisition of digital content, and states and districts should allow maximum flexibility in the use of funds designated for instructional materials. The policies and practices that substantially narrow the materials made available for use in schools should be replaced with advisory guidance based upon clear standards. Data on effective usage should play a major role in judging the quality of instructional materials. Thus, SETDA recommends that states and districts cooperate on research and experimentation, including but not limited to efforts modeled on crowdsourcing and other methods of evaluating products and services, and broadly share those results. Such an approach would provide better metrics for measuring quality in materials, resulting in improved materials over time.

Recommendation 2b: Invest in Infrastructure and Devices to Support the Shift

SETDA recommends that states and districts pursue cost-effective collaborative purchasing of student computing devices, and increase flexibility of funding in dedicated funding streams to optimize the use of digital resources in schools and to leverage the print to digital shift in assessment, instruction, and professional development. The devices also are crucial for the use of data to track the effectiveness of the digital content in particular and student achievement overall. The valuable implementation of digital content does not, however, need to wait for a one student to one device scenario to be fully realized. It does require a sufficient supply of bandwidth, the enabling technology of modern learning environments. Therefore, as laid out in the SETDA report, "The Broadband Imperative: Recommendations to Address K-12 Education Infrastructure Needs," SETDA recommends that schools should have external internet connections to their internet service provider of 100 Mbps per 1,000 students and staff by 2014-15, and of 1 Gbps per 1,000 students and staff by 2017-18.

Recommendation 2c: Ensure Effective Implementation of Digital Policies

SETDA recommends that states and districts identify and disseminate effective models of implementation for how to make the shift from print to digital. Implementation of the prior recommendations are necessary but not sufficient in ensuring students are successful with these materials. Teachers need to understand how to create, find, vet, and use digital and open content. Colleges of Education need to prepare incoming teachers so this skill set is established as second nature. School districts need to develop and implement sustainable plans for sufficient technology support, maintenance, and to ensure the technology is up to date and working. These efforts need to be an integral part of other initiatives and programs throughout the district to ensure the investment in technology is maximized.

Recommendation 3: Ensure a Vibrant Marketplace for Digital and Open Content

SETDA recommends that policymakers, educators, and business leaders collaborate to create alternative, flexible models for the creation, acquisition, distribution, and use of digital content. The market has changed in other media, such as music, news, and television. It's on the path to change for instructional materials as well. The 50-plus-year-old business model of states and districts purchasing one textbook per student per subject per grade level is out of sync in a world where people expect to mix and match materials of all kinds from various content providers, including user-generated content. Innovation is largely absent from instructional materials at a time when students are using and creating content in ways unheard of a few short years ago. Open educational resources should play a prominent role; the implementation of the Common Core State Standards provides a unique opportunity for states and districts to collaborate in the creation, acquisition, and use of instructional materials aligned with the new standards. Without new business models that allow for and encourage more granular, flexible, and up-to-date content, the inevitable shift to digital will be slowed, to the detriment of students.

Implementing these recommendations and reimagining an integral element of the educational system within five years is a daunting task. Yet, most states and districts have traveled partially down that path already, and the country's culture and workforce have fully embraced digital content as an essential component of daily life. Using and creating digital content is not new for our students nor for many of our educators. What is necessary is recognition of the need and power of such a shift, a focus on implementing the shift efficiently and effectively, and leveraging that shift across other core K-12 functions, including student assessment, instruction, professional learning, and administrative functions. If we are serious about offering a college and 21st century career-ready education for all students, we do not have the luxury of further delay. The effort must accelerate rapidly and in a coordinated manner to jumpstart innovation in the instructional materials market, but more importantly, to ensure our students receive the best possible education.

Appendix A: Key Questions to Address in Adopting Digital Instructional Materials

Your leadership team has engaged the community, administrators, and educators, considered the advantages of print versus digital, and taken the first step to create a vision for how digital content can increase student achievement and engagement, and leverage technology for multiple purposes in schools and classrooms. You have begun to identify policies that hinder the effective acquisition and use of digital content. What do you need to watch out for as you take this journey toward a digital world? Here are five key issues and associated questions to consider in making the shift.

1. Cost and Cost-Effectiveness

- What is the cost of the digital content and how does it compare to the costs being spent for the print materials it would replace?
- Are high-quality open educational resources (OER) available for the subject area for free? What costs would you incur by making use of OER?
- Are any and all costs sustainable over time?
- What is the recommended student/teacher-to-device ratio to make best use of the digital content?

2. Technology Implementation

- If new computing devices will be acquired, are they read-only devices or can they be used for other purposes, such as for content creation (term papers and presentations) and assessment?
- Is the digital content available in multiple formats and can it be used with different operating systems? What are the minimum and recommended device specifications to make the best use of the digital content? If the content is not device agnostic, what are the tradeoffs you might be forced to make?
- Can the digital content be saved to computing devices, made available online, or both? Is internet access required to see and interact with the content? Can the content follow the user and adapt to the device being used at the moment?
- Are the plans for acquisition of digital content in sync with plans to expand the broadband access coming to the building as well throughout the building?
- How are the needs of students with disabilities and English language learners addressed by the technology and the content? What are the advantages and disadvantages of the content for these students? At the most basic level, is the content accessible? Additionally, does it provide the supports and scaffolds to support independent learning by a diverse student population?
- How well does the digital content reflect the state of the art in digital content creation and delivery? How does digital functionality make a difference in the quality and engagement level of the content (i.e., is an interactive app or textbook significantly more engaging, and of higher quality, than an ePub or PDF format?)

3. Teacher Preparedness

- What teacher support and/or training is required to enable teachers to effectively use the content in their classrooms and with their students?

- Can teachers and/or students revise, update, rate, annotate, or comment on the digital content, with appropriate attention to versioning and quality control? Can people contribute their own content?

4. Quality and Alignment to Standards

- Is the content static or does the content provider offer updates and enhancements to the digital content on an ongoing or periodic basis? How are those made available to users? If the digital content contains errors, what is the process for having those errors identified and corrected?

- How is alignment to content standards accomplished and validated? Can users search by standard?

- How easily navigable is the digital content and how robust is the search functionality?

- How is the digital content tagged, and can users add additional tags? Must you use a special search tool or website or can digital content objects be found via the major internet search engines?

- How reliable is the source that's hosting the content? Is the content likely to be "findable" in the future?

5. Intellectual Property

- Are the intellectual property (IP) rights of individual digital content objects clearly indicated and can users search digital content resources by IP license?

- Are there any restrictions on how the content can be combined with the content of other providers, including at the section, lesson or unit levels? Is the use of a custom platform or website required to access the content or can access be provided via a school's platform of choice?

- Are there restrictions on the redistribution and access to the content, for instance, by students, parents, or siblings at home—or by students and teachers in other schools or districts?

- Once the content is acquired, does the school or district retain the rights to use it in perpetuity or only upon payment of ongoing fees?

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